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## NETWORK TRANSFORMATIONS IN ECONOMY

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*In the context of ever-increasing market competition, networked interactions play a special role in the economy. The network form of entrepreneurship is increasingly viewed as an effective organizational structure to create a market value embedded in innovative business solutions. The authors study the characteristics of a network as an economic category and emphasize certain similarities between Russian and international approaches to identifying interactions of economic systems based on the network principle. The paper focuses on the types of networks widely used in the economy. The authors analyze the transformation of business networks along two lines: from an intra- to an inter-firm network and from an inter-firm to an inter-organizational network. The possible forms of network formation are described depending on the strength of connections and the type of integration. The drivers and reasons behind process of transition from a hierarchical model of the organizational structure to a network type are identified. The authors analyze the advantages of creating inter-firm networks and discuss the features of inter-organizational networks as compares to inter-firm ones. The article summarizes the reasons for and advantages of participation in inter-organizational networks and identifies the main barriers to the formation of inter-organizational network.*

**Key words:** network, interfirm network, interorganizational network, network transformation

The significance of networking was emphasised as early as the 1960 in the development of the holarchic approach proposed by Arthur Koestler [38]. Studies into the competitiveness of networking companies gained popularity in the late 1980s. A broad understanding of the concept of ‘network’ contributed to the development of a number of research areas at the interface of sociology, economic geography,

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and economics. Network studies developed within industrial economics, organisational sociology, game theory, resource dependence theory, population ecology, institutional theory, etc. The complexity of the cause-effect relationships characteristic of networking explains the diversity of the forms of networking identified by scholars. Despite the interdisciplinary scope and the applied nature of current research, the problems of network transformations in the economy remain little studied; in particular, the mechanism of transition of an intra-firm network into an inter-firm one requires thorough investigation.

The hierarchy-based organisational structure of a company prevalent in the industrial era does not meet modern market requirements. A shortening product life cycle, increasing globalisation rates, and the ever changing market situation result in economic agents reacting swiftly and developing the adaptive ability. Modern economy based on the value of knowledge as a strategic resource generates “unnatural” — from the perspective of classical economy — networks of firms, NGOs, and other actors from different economic industries and areas of social activities. The key advantages of such organisational structures have been discussed in [14; 50; 52]; they relate to the flexibility of combining different components and using new opportunities in comparison to the vertical hierarchy.

This article aims to identify the areas and features of the transformation of different network types. To this end, the following problems are to be solved: 1) producing a detailed definition of a network in the economy and considering different types of networks; 2) identifying possible ways of the transformation of one network type into another; 3) identifying the reasons behind and features of these transformations.

### **The concept of a network in the economy**

The polysemy of the economic category of ‘network’ relating to the complexity and ambiguity of the studied object sets a methodological problem of specifying the approach to interpreting this concept within a given study. Some international scholars regard Henri Fayol [22], who suggested considering an individual employee as a cell of a common nervous system, as the founding father of the networking ideas. Later, this concept was developed by A. Koestler, who studied the features of an inter-firm network [38]. A significant contribution to the study of networks was made by M. Granovetter [22]. He analysed the “embeddedness” of economic processes in the social structure stressing that O. Williamson’s new institutional economics should be enhanced through taking into account the factors of long-term networking that affect the degree of decision-making rationality. The interest in networking in the economy led to the emergence of a significant number of works dedicated to networks [6; 16; 32; 36; 37]. A generalisation of their key ideas makes it possible to understand the features of networking consisting in the actors’ aspiration towards cooperation, system connections between individual members of the network, the social and dyadic nature of business relations between the actors, their wide diversity, a

pronounced unifying structure, a combination of vertical and horizontal relations, geographical and organisational boundaries, the hierarchical nature of connections based on mutual dependence, and common values and standards.

In 1929, L. Freeman suggested describing the structure of a network based on three parameters: degree (determined by the number of connections per point), closeness (the time required for disseminating information from one point to others), and betweenness (control over the communications between other network points), which describe the actors' organisational network interactions [19]. This approach to defining networks through a number of criteria was developed in the studies of other authors. For instance, [37] uses four measures to describe networks: density, cohesion, centrality, and multiplicity. G. Gereffi suggested defining a network through studying its management structure, the nature of production and consumption relations, social and institutional embeddedness [20]. Chinese authors emphasise intensity, density, non-redundancy, betweenness, reciprocity, and multiplicity [59].

R. Miles and C. Snow [40] developed an approach that considered network structures as an organisational form or a strategic organisational solution. Based on the empirical studies, the authors came to a conclusion that the network structure of an organisation was a result of the management's responses to the challenges of the environment. Therefore, firm networks belong to the most developed form of economic activity organisation within the classical chain of "linear — functional — divisional — matrix" — *network* organisation. The key stage catalysing the premises of its formation is its entrance into the global market, which increases the need for cooperation between equal partners, information exchange, and the emergence of grounds for trust. At the same time, the network structure identified and described by R. Miles and C. Snow is also characterised by an independent position of the network actors that act in the framework of market mechanisms and orientation towards improving the final product or service, which suggests readiness for additional investment in the formation of a common value (manifested in the product) over contractual obligations [40].

According to [3—6; 16, 32; 36; 37, etc.], in a broad sense, a network should be attributed to a socioeconomic system with a certain type of relations characterised by high intensity between individual elements — individuals, firms, NGOs, governmental institutions, and groups thereof.

We believe that an exhaustive definition can resemble that given in [2]. Inter-organisational networks are interpreted as a system of contracts between economic agents within one or more socioeconomic systems characterised by a coordinated and stable nature aimed at achieving common long-term objectives through mobilising, combining, and using resources, competences, and knowledge.

Most scholars [51; 28] stress the historical and natural character of network development and consider networks based on the principle of systematicity, openness, and self-organisation. However, other researchers [34; 41; 45] emphasise the possibility of "top-bottom" organisation of networks

(for example, strategic networks, value producing networks), when actors are selected according to the roles formulated in advance. In general, the process of network formation can be divided in three stages [23]: 1) the preliminary stage, where potential partners identify each other and set out conditions for the emergence of network relations; 2) the stage of identification of cooperation areas and development of relations, where network members formulate a common goal based on personal values; 3) the stage of structuring, when different structures are formed to support joint events, and relations are “cemented”.

The interdisciplinary nature of network studies explains the emergence of different network types and subtypes: business [27; 39; 57], innovative [18], cooperation [56], corporate innovative [55], social [53], global production or innovation [11; 17] networks, innovations systems [46], value added chains [21], virtual corporations / enterprises / teams / laboratories / universities, (dynamic) virtual organisations [56; 43], extended enterprises [33], clusters [13; 48], business ecosystems [56], focal networks [56; 43] and many others.

The diversity of networks in the economy is often classified according to the following criteria:

1) control over property:

— *an external network* corresponds to the structure of stable connections between independent actors (firms, NGOs, organisations, financial and business associations, households, etc.) that developed on the basis of implicit or explicit contracts on producing goods and services and aimed at adapting to changing market conditions and protection of mutually beneficial interests [35];

— *an internal network* corresponds to the structure of stable connections between departments and individual employees within an organisation, including those beyond their employment duties. Essential to improving an internal network is the creation of favourable conditions for the formation of exchange flows among its members. The combination and consolidation of complimentary knowledge make the network viable and prevent sub-units from getting caught in the so-called competency trap;

2) member composition:

— *an interpersonal network* corresponds to the structure of stable connections between individuals. The degree of connection is determined by the frequency and period of interactions, level of trust, accumulated experience, as well as the number of persons of trust;

— *an inter-firm network* corresponds to the structure of long-term connections between legally independent firms that cooperate on the basis of trust, good will, and mutual interests to gain business advantage;

— *an inter-organisation network* corresponds to the structure of stable connections between actors that are largely autonomous, not connected territorially, and heterogeneous in terms of context, organisation culture, capital, and interaction purposes. The key features of inter-firm networks is a transition from the mono-centric hegemony of business efficacy to pursuing poly-centric complimentary goals of all partners. An aspiration to produce

innovations and a socially responsible strategy result in the formation of inter-firm networks with the participation of research institutions, the tertiary sector, and society in general (i. e. inter-organisation networks)<sup>1</sup>;

3) network level:

— *local* networks developing between “firms with a history” based on the developed interpersonal connections and characterised by social embeddedness in the economy;

— *regional* networks that are often based on strong cooperation connections thus making it possible for regional actors to maximise gains from cooperation. Good examples are clusters, industrial districts, etc. A regional network can be used by small specialised firms to exchange resources and combine efforts, which increases the general mobility of the network and launch training processes within it. These advantages are of special importance in markets characterised by high innovation spending, short life cycle of the product, and the need for a swift reaction to the changing needs of customers;

— *national* networks are network associations of actors across several regions of a country that have taken on national significance;

— *international* networks bring together a wide range of actors from different regions and countries for the purpose of joint research and innovation activities;

— *global* networks are systems of cooperation for exchanging codified and implicit knowledge between actors concentrated in the leading innovative regions of the world (as a rule, countries of the triad — the USA, EU, and Japan) in order to produce innovations through a joint use of strategic resources;

4) nature of connections:

— a *formal* network is a structure of stable connections between actors existing within bilateral and multilateral agreements;

— an *informal* network suggests the development of stable connections between its members based on the principles of mutually beneficial cooperation without contractual relationships.

### **Transition to the network form of business activity**

Networking processes differ by the strength of connections and can assume various integration forms (Fig. 1). In this case, integration is interpreted as a voluntary association of companies aimed at generating different — including synergetic — effects. Firms participating in networks are characterised by a combination of “classical” integration and quasi-integration accompanied by the formation of hybrid structures. The “classical” type of integration exhibits stronger connections between individual economic entities expressed by the unity of strategic purposes and mechanisms to achieve them.

<sup>1</sup> For more on the network forms of inter-organisation interaction in the field of science and technology see [2].

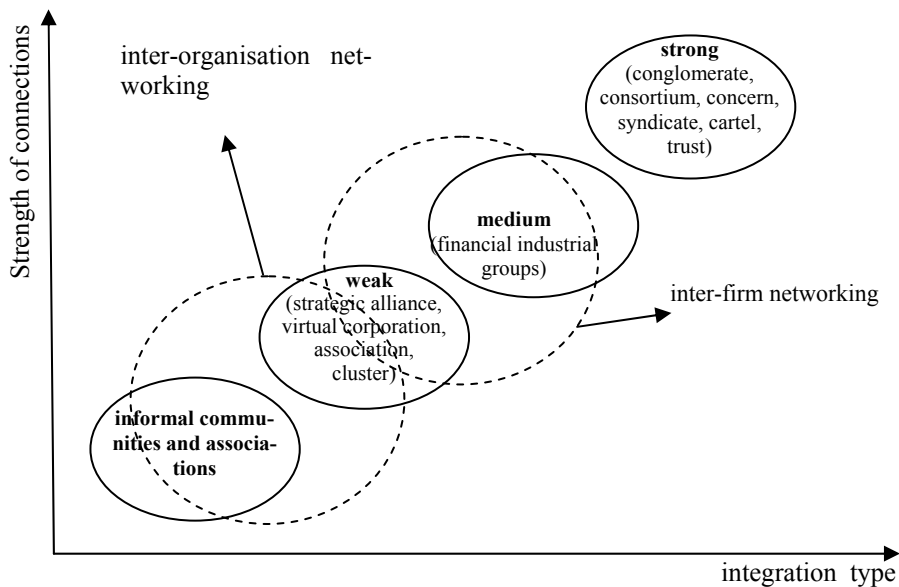


Fig. 1. Network forms

Source: based on [3].

Quasi-integration suggests a possibility of controlling the functioning of technically independent organisations without controlling their property [4, p. 56]. Quasi-integration processes take place both in the context of large businesses like virtual corporations and strategic alliances, as well as in that of small and medium enterprises through clusters, virtual corporations, value added networks, etc. One of the key ways of hybrid formation is the dissemination of horizontal connections against the background of strengthening processes of vertical disintegration aimed, on the one hand, at the contraction of large companies through cutting jobs and downsizing and, on the other hand, the decentralisation of management and control functions [25; 26].

The deformation of large companies' organisational structures towards the prevalence of horizontal network connections over hierarchical ones is indicative of the trend towards the transfer of a part of managerial functions and responsibility to a lower level, where individual business processes take place. The advantages of a decentralised production network are as follows: decreasing uncertainty, risk distribution, overcoming market barriers, rationalisation of control over business processes, flexibility and promptness in decision making, and cost reduction [30; 42]. The negative consequences include increasing unemployment and underemployment rates and a growing gap between those employed at a self-organising firm and the employed to provide services for it. It is worth noting that the decentralisation of production does not always suggest the decentralisation of power [30].

A transition to the network form of business activity organisation is accompanied by a transformation of an intra-form network into an inter-form

one, which relates to giving certain departments relative independence in making managerial decision and, later, restructuring them as independent business units. Interactions between recently formed companies are based on the principles of networking, which imply replacing the classical strictly hierarchical management mechanism with a more flexible one stemming from the development of horizontal communicative connections and stimulating entrepreneurship [1]. This process creates conditions for the development of labour, capital, information, and other markets that are internal for the company.

The driving force behind the changes in the organisational structure resulting from the introduction of innovative solutions into management and business process management is a company's aspiration to increase the efficiency of its business activities in the conditions of growing competition. To secure the market position and increase competitiveness, the company's management should react promptly to market challenges and foresee them. The key reasons behind the transformation of the organisational structure are the orientation towards cost reduction and the ambition to benefit from the process of joint value engineering.

In the first case, the transition to networking consists in reducing transaction and production costs in comparison to those associated with the hierarchical management form. Motives for choosing the cost-cutting strategy can be as follows:

- changes in the territorial or industrial scale of business activities. A combination of the globalisation and regionalisation processes results in the need for companies to expand their influence also through increasing their existing market presence through specialisation and improvement of key competences, expansion into new regional, national, international, and global markets, and diversification of activities;

- overcoming crises, which requires the mobilisation of all internal resources and untapped reserves of the company. For instance, turning a company around may require restructuring with forming a number of small and medium enterprises closely connected with the head organisation.

In the second case, the transition to the inter-firm network offers the following advantages: the division and reduction of risks associated with business activities, an increase in innovative capabilities, and gaining access to new knowledge, competences, and information. In this context, network cooperation suggests the integration of value added chains at the points of mutual interest. As a rule, such points are activities that are complimentary to the value adding process of one company and crucial for the other. The general competitiveness of a network depends on the efficiency of the process of managing its system of values, which include, alongside the value chains of the company, suppliers, subcontractors, customers, and other stakeholders [49; 58]. This process is non-linear and is accompanied by the formation of multilateral connections between economic entities, which also facilitates the maximisation of the total value added within the network (Fig. 2).



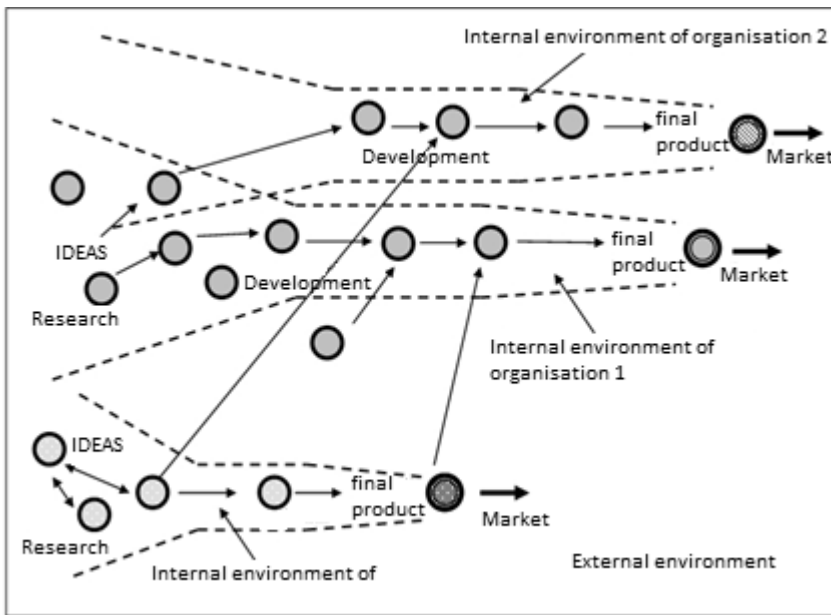


Fig. 2. An open innovation model within a network

Source: based on [10].

Most organisations operating at the national, international, and global levels are also embedded in different inter-organisation networks — a cost-effective means of gaining access to key knowledge, competences, innovations, and know-hows that are lacking in the organisation itself and cannot be transferred through licensing. An inter-organisation network is viewed as a prompt and effective way of training and obtaining skills.

Being a member of an inter-organisation network grants prompt access to information [8]. Close relationships between two organisations contribute to the formation of information channels that can be used to learn about the competence and reliability of the other party, as well as new cooperation opportunities, which otherwise would be problematic. The advantage of “being informed” as a result of networking is a traditional subject of network analysis [19]. As a rule, organisations strive to forge stable and preferential relations characterised by confidence and effective exchange of information with certain partners [15; 50]. Over time, these “embedded relations” [22] create a network, which becomes a constantly growing storage of information about the utility, competences, as well as reliability of potential partners [25; 51].

An inter-organisation network makes it possible to gain access to additional resources and/or opportunities also in terms of the coordination of joint efforts towards product enhancement, and expanding and accelerating access to markets [12; 29]. Moreover, inter-organisation cooperation can be encouraged through cost-cutting in the course of joint R&D activities [12; 28].

C. Oliver identifies the following reasons for organisations to establish inter-organisation relations [44]: necessity created by a law or regulation; information asymmetry, which makes it possible for one of the parties to control the other party or its resources; reciprocity manifested in pursuing common goals and interests; efficiency, when organisation can increase production and cost-efficiency through cooperation; stability, when cooperation makes it possible to forecast, react to, and reduce risks and uncertainties; legitimacy manifested in the creation or improvement of the reputation, image, and prestige.

A significant increase in the formation of inter-organisation networks has been observed since the 1980s [7; 31]. Mutual dependence is the most common explanation of the formation of inter-organisation cooperation links. In a broad sense, dependence incorporates two sets of factors: purchase of resources and uncertainty reduction. Organisations build cooperation connections to gain access to maximum diversified cognitive and resource opportunities, which are at least partially controlled by other organisation to use them for innovation generation. Therefore, inter-organisation cooperation is a means to manage an organisation's dependence on other organisations in its environment and mitigate the uncertainty resulting from this dependence [9; 47]. The main limitations to the formation of inter-organisation networks are complications associated with receiving information on the competences and needs of potential partners and necessity resulting from a lack of information on the reliability of potential partners, whose behaviour is crucial to the network's success [24; 25].

## Conclusion

The formation of network connections is a natural process of the evolution of a firm's organisation structure under the influence of rapidly changing economic conditions. We have considered a complex multi-stage process of the transformation of an intra-firm network into an inter-firm one, which is accompanied by a significant structural transformation from the department hierarchy to a network association of business units. The key reasons behind the change in the approach to business process management are the ambition to enter new — including international — markets, cut costs, and gain access to strategically important resources — knowledge and competences. Further internationalisation results in a need to develop stable horizontal cooperation links with partial complementarity at the level of information exchange among a wide range of actors characterised by different types of ownership and field of activity, i.e. membership in inter-organisation networks. The formation of a hybrid structure in the course of the transformation of an intra-firm network into an inter-firm one unlocks the internal potential, whereas the intra-firm — inter-firm transformation occurs through (possibly informal) association of individual actors with a “history” of functioning in the market. Studies in this field require further analysis of the transformation of a firm's organisational structure in the course of intra-firm — inter-firm transition, especially, as to identifying the mechanism and forms of such transformation.

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